

Claims:

1. A power output apparatus that outputs power to a driveshaft, said power output apparatus comprising:

5 a first internal combustion engine that outputs power;
 a first motor that uses the output power of the first internal combustion engine to generate electric power;

 a second internal combustion engine that outputs power to the driveshaft;

10 a second motor that inputs and outputs power from and to the driveshaft;

 an accumulator unit that is capable of transmitting electric power to and from the first motor and the second motor;
 and

15 a first connection disconnection structure that connects and disconnects an output shaft of the first internal combustion engine with and from an output shaft of the second internal combustion engine.

20 2. A power output apparatus in accordance with claim 1, said power output apparatus further comprising:

 a second connection disconnection structure that connects and disconnects the output shaft of the second internal combustion engine with and from the driveshaft.

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3. A power output apparatus in accordance with claim 1,

wherein the first internal combustion engine is drivable with high efficiency at a preset drive point, and

the first motor generates electric power with high efficiency by using the output power of the first internal combustion engine driven at the preset drive point.

4. A power output apparatus in accordance with claim 1, wherein the second internal combustion engine is drivable with high efficiency in a preset rotation speed range, and

10 the second motor outputs a torque close to a maximum possible torque, which is expected as a torque to be output to the driveshaft in a rotation stop state of the driveshaft.

5. A power output apparatus in accordance with claim 4, wherein the preset rotation speed range is from an idling rotation speed or a preset first rotation speed higher than the idling rotation speed to a maximum possible rotation speed expected to the driveshaft.

20 6. A power output apparatus in accordance with claim 1, said power output apparatus further comprising:

a charge state detection unit that detects a state of charge of the accumulator unit;

a power demand setting module that sets a power demand to be output to the driveshaft, in response to an operator's operation; and

a control module that controls the first internal combustion engine, the first motor, the second internal combustion engine, the second motor, and the first connection disconnection structure to keep the state of charge of the accumulator unit detected by the charge state detection unit in a predetermined charge range and to ensure output of a power, which is equivalent to the power demand set by said power demand setting module, to the driveshaft.

7. A power output apparatus in accordance with claim 1, said power output apparatus further comprising:

a second connection disconnection structure that connects and disconnects the output shaft of the second internal combustion engine with and from the driveshaft;

a charge state detection unit that detects a state of charge of the accumulator unit;

a power demand setting module that sets a power demand to be output to the driveshaft, in response to an operator's operation; and

a control module that controls the first internal combustion engine, the first motor, the second internal combustion engine, the second motor, and the first connection disconnection structure to keep the state of charge of the accumulator unit detected by the charge state detection unit in a predetermined charge range and to ensure output of a power, which is equivalent to the power demand set by said power demand

setting module, to the driveshaft.

8. A power output apparatus in accordance with claim 7,
wherein said control module controls the second connection
5 disconnection structure, when a rotation speed of the
driveshaft is lower than a preset reference speed, to disconnect
the output shaft of the second internal combustion engine from
the driveshaft, while controlling the second connection
disconnection structure, when the rotation speed of the
10 driveshaft is not lower than the preset reference speed, to
connect the output shaft of the second internal combustion
engine with the driveshaft.

9. A power output apparatus in accordance with claim 8,
15 wherein said control module controls the first connection
disconnection structure, when the rotation speed of the
driveshaft is not lower than the preset reference speed and a
torque demand at the set power demand is less than a preset
reference torque, to disconnect the output shaft of the first
20 internal combustion engine from the output shaft of the second
internal combustion engine, while controlling the first
connection disconnection structure, when the rotation speed of
the driveshaft is not lower than the preset reference speed and
the torque demand at the set power demand is not less than the
25 preset reference torque, to connect the output shaft of the
first internal combustion engine with the output shaft of the

second internal combustion engine.

10. A power output apparatus that outputs power to a driveshaft, said power output apparatus comprising:

5 a first internal combustion engine that is driven with high efficiency at a preset drive point and outputs power;

 a first motor that uses the output power of the first internal combustion engine driven at the preset drive point to generate electric power with high efficiency;

10 a second internal combustion engine that outputs power to the driveshaft;

 a second motor that inputs and outputs power from and to the driveshaft; and

 an accumulator unit that is capable of transmitting
15 electric power to and from the first motor and the second motor.

11. A power output apparatus in accordance with claim 10, wherein the second internal combustion engine is drivable with high efficiency in a preset rotation range, and

20 the second motor outputs a torque close to a maximum possible torque, which is expected as a torque to be output to the driveshaft in a rotation stop state of the driveshaft.

12. A power output apparatus in accordance with claim 10,
25 said power output apparatus further comprising:

 a charge state detection unit that detects a state of

charge of the accumulator unit;

a power demand setting module that sets a power demand to be output to the driveshaft, in response to an operator's operation; and

5 a control module that controls the first internal combustion engine, the first motor, the second internal combustion engine, and the second motor to keep the state of charge of the accumulator unit detected by the charge state detection unit in a predetermined charge range and to ensure
10 output of a power, which is equivalent to the power demand set by said power demand setting module, to the driveshaft.

13. A power output apparatus that outputs power to a driveshaft, said power output apparatus comprising:

15 a first internal combustion engine that outputs power;
a first motor that uses the output power of the first internal combustion engine to generate electric power;
a second internal combustion engine that outputs power to the driveshaft;

20 a second motor that outputs to the driveshaft a torque close to a maximum possible torque, which is expected as a torque to be output to the driveshaft in a rotation stop state of the driveshaft; and

an accumulator unit that is capable of transmitting
25 electric power to and from the first motor and the second motor.

14. A power output apparatus in accordance with claim 13, wherein the second internal combustion engine is drivable with high efficiency in a specific rotation speed range from an idling rotation speed or a preset first rotation speed higher
5 than the idling rotation speed to a maximum possible rotation speed expected to the driveshaft.

15. A power output apparatus in accordance with claim 13, said power output apparatus further comprising:

10 a charge state detection unit that detects a state of charge of the accumulator unit;

a power demand setting module that sets a power demand to be output to the driveshaft, in response to an operator's operation; and

15 a control module that controls the first internal combustion engine, the first motor, the second internal combustion engine, and the second motor to keep the state of charge of the accumulator unit detected by the charge state detection unit in a predetermined charge range and to ensure
20 output of a power, which is equivalent to the power demand set by said power demand setting module, to the driveshaft.

16. A motor vehicle comprising:

a first internal combustion engine that outputs power;

25 a first motor that uses the output power of the first internal combustion engine to generate electric power;

a second internal combustion engine that outputs power to a driveshaft linked with an axle of said motor vehicle;

a second motor that inputs and outputs power from and to the driveshaft;

5 an accumulator unit that is capable of transmitting electric power to and from the first motor and the second motor;

a first connection disconnection structure that connects and disconnects an output shaft of the first internal combustion engine with and from an output shaft of the second internal
10 combustion engine; and

a second connection disconnection structure that connects and disconnects the output shaft of the second internal combustion engine with and from the driveshaft.

15 17. A motor vehicle in accordance with claim 16, said motor vehicle further comprising:

a charge state detection unit that detects a state of charge of the accumulator unit;

a power demand setting module that sets a power demand
20 to be output to the driveshaft, in response to an operator's operation; and

a control module that controls the first internal combustion engine, the first motor, the second internal combustion engine, the second motor, and the first connection
25 disconnection structure to keep the state of charge of the accumulator unit detected by the charge state detection unit

in a predetermined charge range and to ensure output of a power, which is equivalent to the power demand set by said power demand setting module, to the driveshaft.

5 18. A motor vehicle in accordance with claim 17, wherein
said control module controls the second connection
disconnection structure, when a rotation speed of the
driveshaft is lower than a preset reference speed, to disconnect
the output shaft of the second internal combustion engine from
10 the driveshaft, while controlling the second connection
disconnection structure, when the rotation speed of the
driveshaft is not lower than the preset reference speed, to
connect the output shaft of the second internal combustion
engine with the driveshaft.

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 19. A motor vehicle in accordance with claim 18, wherein
said control module controls the first connection disconnection
structure, when the rotation speed of the driveshaft is not
lower than the preset reference speed and a torque demand at
20 the set power demand is less than a preset reference torque,
to disconnect the output shaft of the first internal combustion
engine from the output shaft of the second internal combustion
engine, while controlling the first connection disconnection
structure, when the rotation speed of the driveshaft is not
25 lower than the preset reference speed and the torque demand at
the set power demand is not less than the preset reference torque,

to connect the output shaft of the first internal combustion engine with the output shaft of the second internal combustion engine.

5 20. A motor vehicle comprising:

 a first internal combustion engine that is driven with high efficiency at a preset drive point and outputs power;

 a first motor that uses the output power of the first internal combustion engine driven at the preset drive point to
10 generate electric power with high efficiency;

 a second internal combustion engine that outputs power to a driveshaft linked with an axle of said motor vehicle;

 a second motor that inputs and outputs power from and to the driveshaft;

15 an accumulator unit that is capable of transmitting electric power to and from the first motor and the second motor;

 a charge state detection unit that detects a state of charge of the accumulator unit;

 a power demand setting module that sets a power demand
20 to be output to the driveshaft, in response to an operator's operation; and

 a control module that controls the first internal combustion engine, the first motor, the second internal combustion engine, and the second motor to keep the state of
25 charge of the accumulator unit detected by the charge state detection unit in a predetermined charge range and to ensure

output of a power, which is equivalent to the power demand set by said power demand setting module, to the driveshaft.

21. A motor vehicle comprising:

5 a first internal combustion engine that outputs power;
 a first motor that uses the output power of the first internal combustion engine to generate electric power;

 a second internal combustion engine that outputs power to a driveshaft linked with an axle of said motor vehicle;

10 a second motor that outputs to the driveshaft a torque close to a maximum possible torque, which is expected as a torque to be output to the driveshaft in a rotation stop state of the driveshaft;

 an accumulator unit that is capable of transmitting
15 electric power to and from the first motor and the second motor;

 a charge state detection unit that detects a state of charge of the accumulator unit;

 a power demand setting module that sets a power demand to be output to the driveshaft, in response to an operator's
20 operation; and

 a control module that controls the first internal combustion engine, the first motor, the second internal combustion engine, and the second motor to keep the state of charge of the accumulator unit detected by the charge state
25 detection unit in a predetermined charge range and to ensure output of a power, which is equivalent to the power demand set

by said power demand setting module, to the driveshaft.